Massachusetts Department of Environmental Protection

3rd Annual Progress Report on the *Beyond 2000 Solid Waste Master Plan*

September 2004

Executive Summary

In the *Beyond 2000 Solid Waste Master Plan* (*Master Plan*), the Executive Office of Environmental Affairs (EOEA) and the Department of Environmental Protection (DEP) established a plan and vision for how Massachusetts will manage its solid waste for the next decade. In the *Master Plan*, DEP committed to providing annual reports on solid waste and waste reduction data and progress towards meeting waste reduction goals.

This *3rd Annual Progress Report* includes the following sections:

- Solid waste data for **Calendar Year 2002 (CY02)** and updated waste reduction rates and waste management capacity projections based on this data
- An update on waste reduction program accomplishments in **Fiscal Year 2004 (FY04)**

Progress in Meeting Waste Reduction Milestones

One of the Commonwealth's goals is to achieve a 70 percent waste reduction rate by 2010, as laid out in the *Beyond 2000 Solid Waste Master Plan (2000 Master Plan)*. In 2002, Massachusetts recorded:

- An overall waste reduction rate of 55 percent (a 2% decrease from 2001[1])*(Note: This includes recycling and source reduction of both municipal solid waste (MSW) and construction and demolition (C&D) debris.)*
    - An MSW Waste reduction rate of 38 percent (a 5 % point decrease from 2001).
    - A C&D waste reduction rate of 86 percent (a 5% point increase from 2001).
- An overall recycling rate of 47 percent (an increase of one percent from the previous year) *(Note: This includes recycling of both MSW and C&D debris.)*
    - An MSW recycling rate of 31% (a 3% decrease from 2001) .
    - A C&D recycling rate of 75% (a 6% point increase from 2001).
- An increase in total waste generation (up 3 percent from 2001).
- An increase in the tons of waste disposed (up 2 percentage points from 2001).

The decrease in the MSW waste reduction rate accounted for the decline in overall waste reduction. This decrease was due to increased MSW waste generation despite a slowed economy (normally waste generation would be expected to decrease when the economy slows.) MSW recycling also decreased, which may have been due to some businesses cutting back on recycling programs due to depressed markets for some recyclable commodities in 2002. C&D waste generation also increased, however increased C&D recycling and waste diversion caused the C&D waste reduction rate to increase from 81% in 2001 to 86% in 2002.

Environmental and Economic Benefits of Recycling

Recycling and waste reduction contribute important environmental and economic benefits to the Commonwealth. In 2002, Massachusetts prevented the disposal of 8 million tons of waste through source reduction and recycling, the equivalent 22 new 1,200 ton per day disposal facilities. Waste reduction

[1] DEP has historically used Gross State Product data to estimate what generation would be without source reduction. Because the release of actual Gross State Product data for 2002 has been delayed until December 2004, DEP estimated the 2002 waste reduction rate using the Current Economic Index (CEI), provided by the University of Massachusetts, Donahue Institute, Massachusetts Benchmarks. The CEI is designed to track GSP.

slows global warming, conserves natural resources, saves energy, and prevents pollution. By recycling and composting in 2002, Massachusetts is estimated[2] to have:

- Reduced greenhouse gas emissions by more than 1 million tons of carbon equivalent per year.
- Saved nearly 12 trillion BTUs of energy, equivalent to the annual energy consumption of 115,000 households, 2.1 million barrels of oil, or nearly 100 million gallons of gasoline.
- Saved nearly 570,000 tons of iron ore, coal, and limestone and saved more than 16 million trees.

In addition, recycling bolsters the state's economy. Recycling, reuse, and remanufacturing directly support 19,000 jobs in Massachusetts, maintain a payroll of nearly $600 million, and bring in annual revenues of $3.6 billion. Total direct and indirect economic activity from recycling, reuse, and remanufacturing is estimated to generate more than $142 million annually in state revenues for Massachusetts[3].

Waste Management Capacity Projections

The *2000 Master Plan* set a goal of no net export or import of solid waste by 2006 and recognized that in addition to aggressive waste reduction, additional landfill capacity was needed to maintain a balanced waste management system. Based on planned landfill projects, it is clear that Massachusetts will not reach a no net import or export level by 2006. Since the 2001 Progress Report was issued, DEP permitted approximately 1.3 million tons of annual landfill capacity through expansions at existing landfills.

FY2004 Master Plan Implementation Highlights

In FY04, DEP published for public comment draft regulatory revisions to 310 CMR 19.000 (Solid Waste Facility Regulations), along with three companion guidance documents. DEP continued to permit and oversee solid waste facilities and operations. In addition, DEP received a total of $3.5 million in funding to support a wide range of recycling and waste reduction programs and projects. In light of state and local funding and staffing cuts, DEP focused strategies that seek to increase efficiency, reduce costs, leverage other resources, and build partnerships to continue to reduce waste. DEP also began assessing and updating Master Plan implementation strategies for the coming years. FY04 highlights are listed below:

- **Product Stewardship:** Worked with the carpet industry and other states to implement the Carpet America Recovery (CARE) agreement; secured a $50,000 Electronics Industry Alliance grant to collect data on a residential electronics collection model with Massachusetts Goodwill facilities; and worked with Bottle Bill stakeholders to develop recommendations to support revisions to the Bottle Bill regulations.
- **Source Reduction:** Assisted 30 municipalities considering Pay As You Throw programs, including awarding 12 technical assistance grants; continued to award home compost bin grants and hold workshops; and facilitated surplus equipment exchanges for municipalities.
- **Hazardous Products Reduction:** Discontinued grants for hazardous products collection equipment due to funding cuts; supported development of regional collection programs; provided six school chemical management grants and supported other efforts to remove mercury from schools and hospitals; funded workshops on reducing use of pesticides and fertilizers.
- **Commercial Recycling and Composting:** Expanded the Supermarkets Recycling Organics Initiative to more than 50 stores; developed a food waste recycling brochure for haulers and fact sheet; established Earth's 911 Business Website and Recycling Locator with Earth's 911 and Staples, Inc.; and established business recycling partnerships in nine municipalities; held the

[2] Source: *Recycling Environmental Impacts Model*, Northeast Recycling Council, October 2003.
[3] *Recycling Economic Information Study*, prepared for the Northeast Recycling Council by R.W. Beck, Inc, June 2000.

Fourth Massachusetts Organics Recycling Summit which was attended by over 160 generators of food residuals, compost facility operators, haulers, consultants, and government officials.

- **Residential Recycling and Composting:** Funded 22 technical assistance projects for either individual municipalities or regional groups, that benefited over 1,120,000 residents total; provided targeted recycling and composting equipment grants; held Annual Waste Reduction forum; updated PAYT Implementation Guide and posted on the DEP web site; and held extensive workshops and training sessions.
- **Market Development:** Awarded four Recycling Industry Reimbursement Credit (RIRC) grants for more than $150,000, leveraging an additional $270,000 in matching funds for development of organics and C&D processing capacity; awarded a $185,000 loan through the Recycling Loan Fund to a composting business; and developed a web page for recycling businesses.
- **Construction and Demolition Debris (C&D):** Proposed regulations and guidance for a waste ban on asphalt, brick and concrete, wood and metal; worked with the C&D Subcommittee and Work Groups on C&D processing, market development, and other issues; supported a clean wood separation study; completed a wood market analysis; and worked with gypsum manufacturers and other stakeholders to increase recycling of gypsum wallboard.
- **Solid Waste Regulatory and Policy Development:** Published for public comment draft revisions to 310 CMR 19.000, the solid waste permitting regulations, and accompanying guidance on waste bans, facility impact assessment and beneficial use determinations; assessed transfer station risks and developed recommendations to improve DEP's oversight; developed standards for co-compost materials; and developed draft guidance on managing hydrogen sulfide emissions and risks at landfills.
- **Solid Waste Permitting, Compliance and Enforcement:** Issued over 200 permits in calendar year 2003, including 46 Initial Site Assessments, 36 Beneficial Use Determinations, 17 corrective action designs, and seven landfill permits for more than 1.3 million tons of annual disposal capacity; oversaw three inactive landfill closures; completed almost 500 inspections, including 100 waste ban inspections; and took 85 enforcement actions resulting in over $300,000 in penalties.
- **Waste Planning:** Continued to gather annual recycling, composting, and disposal data; began development of electronic reporting of compost reports, recycling processor surveys, and other solid waste facility reports for calendar year 2004; continued to coordinate activities of the Solid Waste Advisory Committee and subcommittees; and began re-evaluating the Beyond 2000 Master Plan.

Section 1: 2002 Solid Waste Data and Waste Management Capacity Projections

To assist in implementing the *Beyond 2000 Solid Waste Master Plan*, DEP annually collects and analyzes solid waste management system data. The data are used to track progress in meeting waste reduction milestones and to determine the amount of disposal capacity that may be permitted to maintain a balanced waste management system. DEP has updated solid waste data for calendar year 2002 and revised waste management capacity projections through 2010 based on the 2002 data. A description of how DEP collects and analyzes solid waste data can be found in Appendix A. Briefly, DEP calculates the following rates:

Overall Waste Reduction Rate
$$= \frac{(\text{MSW Recycling}^{4} + \text{Source Reduction}^{5}) + (\text{C\&D Recycling + Source Reduction + Other Diversion})}{\text{Total Potential Generation}^{6}}$$

MSW Waste Reduction Rate
$$= \frac{\text{MSW Recycling + Source Reduction}}{\text{MSW Potential Generation}}$$

Non-MSW Waste Reduction Rate
$$= \frac{\text{Non-MSW Recycling + Source Reduction + C\&D Other Diversion}}{\text{Non-MSW Potential Generation}}$$

MSW Recycling Rate
$$= \frac{\text{MSW Recycling}}{\text{MSW Actual Generation (Recycling + Disposal)}}$$

C&D Recycling Rate
$$= \frac{\text{C\&D Recycling}}{\text{C\&D Actual Generation (Recycling + Other Diversion + Disposal)}}$$

C&D Diversion Rate
$$= \frac{\text{C\&D Recycling + C\&D Other Diversion}}{\text{C\&D Actual Generation (Recycling + Other Diversion + Disposal)}}$$

Progress in Meeting Waste Reduction Milestones

Table 1 summarizes waste reduction rates in 2001 and 2002. Waste reduction includes source reduction (preventing waste from being generated), recycling (including composting), and other C&D diversion.[7] Total waste reduction decreased from 57% in 2001 to 55% in 2002. Municipal solid waste (MSW) waste reduction decreased for the second year in a row to 38% from 43% in 2001, and non-municipal solid waste (Non-MSW) waste reduction increased for the second year in a row to 86%, up from 81% in 2001.

The decrease in the MSW waste reduction rate is due to both a decrease in MSW source reduction and a decrease in MSW commercial recycling. Economic activity in Massachusetts decreased from 2001 to 2002, thus decreasing estimated potential MSW generation. However, rather than decreasing with the slowed economy, actual MSW generation increased from 2001 to 2002, resulting in a decrease in source reduction. In addition, MSW commercial recycling decreased from 2001 to 2002. Together, these factors resulted in a decrease in the MSW waste reduction rate.

Because this increase in waste generation appears contrary to decreased economic activity, DEP reviewed national waste generation data from 2002 and found a similar trend in other states and nationwide. National solid waste generation increased from 409 million tons in 2000 to 482 million tons in 2002.

[4] MSW recycling includes both recycling and off site-composting, but does not include home composting, which is considered source reduction.
[5] Source reduction refers to the difference between potential generation and actual generation.
[6] Potential generation refers to what generation would have been without source reduction. DEP has historically used Gross State Product data to estimate what generation would be without source reduction. Because the release of actual Gross State Product data for 2002 has been delayed until December 2004, DEP estimated the 2002 waste reduction rate using the Current Economic Index (CEI), provided by the University of Massachusetts, Donahue Institute, Massachusetts Benchmarks. The CEI is designed to track GSP.
[7] For a discussion of how DEP measures waste reduction, see page 3-7 of the Beyond 2000 Solid Waste Master Plan.

Generation also increased on a per capita basis from 1.46 tons in 2000 to 1.68 tons in 2002. Similar to Massachusetts, the overall recycling rate dropped from 32% in the 2000 report to 27% in the 2002 report[8].

The increase in the Non-MSW waste reduction rate is due to a significant increase in C&D recycling and other diversion of C&D materials such as C&D fines, residuals, and wood for fuel. Similar to MSW, Non-MSW generation increased from 2001 to 2002 despite a slowed economy, resulting in a decrease in source reduction. However, C&D recycling and other diversion increased significantly resulting in an overall increase in the Non-MSW waste reduction rate.

Table 1
Waste Reduction Rates Based on *Potential* Generation

	2001	2002	2010 Milestone
Total Waste Reduction Rate	57%	55%	70%
MSW Waste Reduction Rate	43%	38%	60%
Non-MSW Waste Reduction Rate	81%	86%	88%

Table 2 shows recycling rates based on actual generation. Please see Figure 1 for a graphical description of the differences between waste reduction and recycling rates. Of the total waste that was generated, 47% was recycled in 2002, up from 46% in 2001. The MSW recycling rate was down from 34% in 2001 to 31% in 2002. The C&D recycling rate was 75% in 2002, up from 69% in 2001.

Table 2
Recycling Rates Based on Actual Generation[9]

	2001	2002
Overall Recycling	46%	47%
MSW Recycling *	34%	31%
C&D Recycling	69%	75%

*Excludes backyard composting which is source reduction

Environmental and Economic Benefits of Recycling

In 2002, Massachusetts prevented the disposal of 8 million tons of waste through a combination of source reduction, recycling, and other diversion, saving enough landfill space to eliminate the need for 22 landfills each equal to the state's largest (1,200 tons per day). Waste reduction also slows global warming, conserves natural resources, saves energy, and prevents pollution. By source reducing, recycling, or composting municipal solid waste alone in 2002, Massachusetts is estimated[10] to have:

- Reduced greenhouse gas emissions by more than 1 million tons of carbon equivalent per year.
- Saved nearly 12 trillion BTUs of energy, equivalent to the annual energy consumption of 115,000 households, 2.1 million barrels of oil, or nearly 100 million gallons of gasoline.
- Saved nearly 570,000 tons of iron ore, coal, and limestone and saved nearly 16 million trees.

[8] *Biocycle* magazine, January 2004.
[9] Includes C&D Other Diversion as generation, but not recycling. This was not counted as generation in the past.
[10] Source: *Recycling Environmental Impacts Model*, Northeast Recycling Council, October 2003.

In addition, recycling bolsters the state's economy. Recycling, reuse, and remanufacturing directly support 19,000 jobs in Massachusetts, maintain a payroll of nearly $600 million, and bring in annual revenues of $3.6 billion. Total direct and indirect economic activity from recycling, reuse, and remanufacturing is estimated to generate more than $142 million annually in state revenues for Massachusetts[11].

[11] *Recycling Economic Information Study*, prepared for the Northeast Recycling Council by R.W. Beck, Inc, June 2000.

Solid Waste Management 1998 – 2002

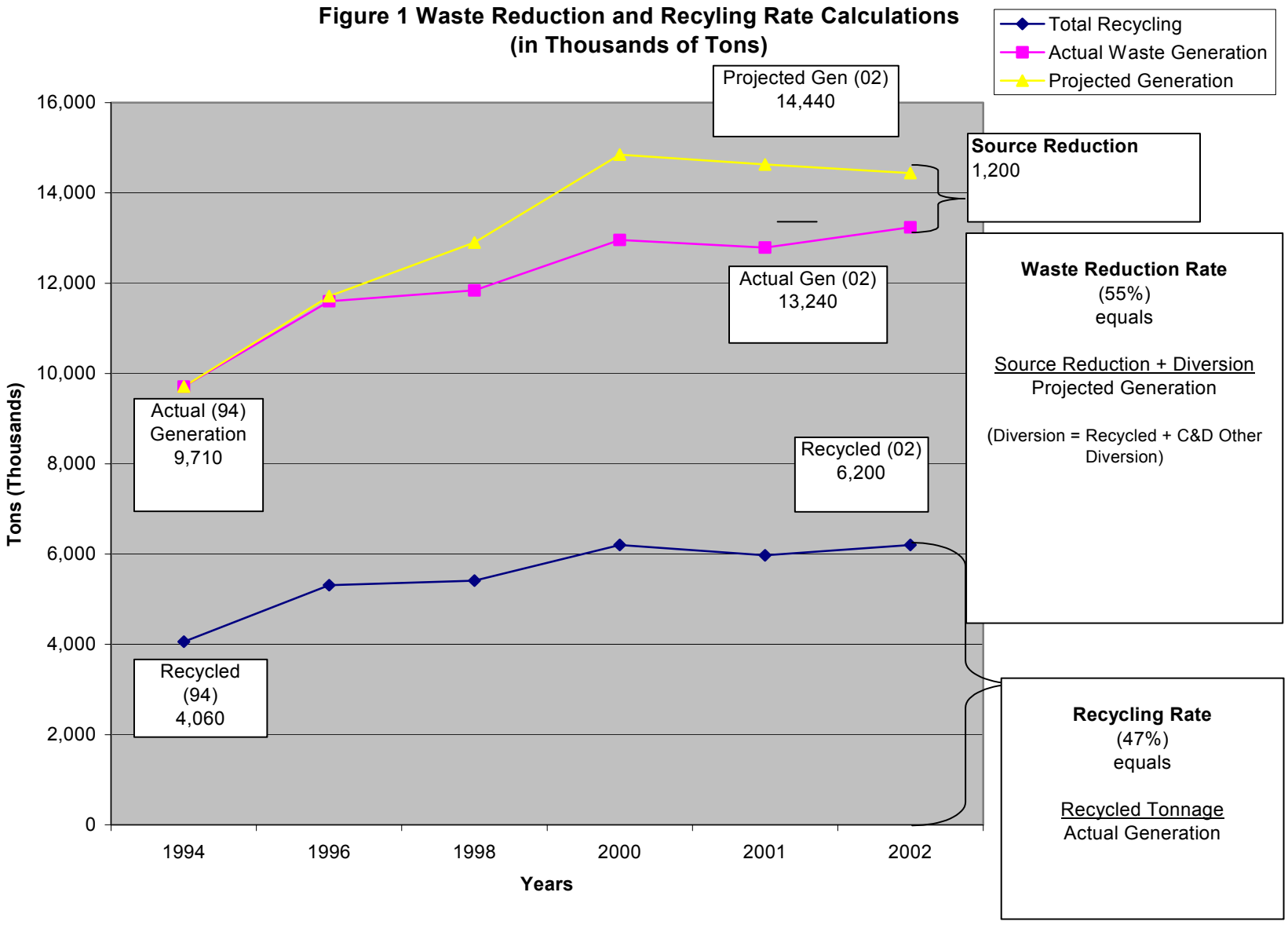
Table 3 presents a comprehensive picture of solid waste management in Massachusetts for calendar years 1998-2002.

Table 3
Solid Waste Management 1998-2002 (in tons per year)

Integrated Solid Waste Management System 1998-2002							
			1998	**1999**	**2000**	**2001**	**2002**
Potential Generation			**12,900,000**	**13,870,000**	**14,850,000**	**14,660,000**	**14,440,000**
	MSW		8,270,000	8,890,000	9,520,000	9,380,000	9,260,000
	Non-MSW		4,630,000	4,660,000	5,330,000	5,250,000	5,180,000
Source Reduction			**1,070,000**	**1,320,000**	**2,040,000**	**1,880,000**	**1,200,000**
	MSW		900,000	1,300,000	1,530,000	1,270,000	900,000
	Non-MSW		170,000	20,000	510,000	610,000	300,000
Total Generation			**11,840,000**	**12,550,000**	**12,960,000**	**12,780,000**	**13,240,000**
MSW			7,930,000	8,140,000	7,990,000	8,130,000	8,350,000
		Residential	3,660,000	3,680,000	3,130,000	3,130,000	3,300,000
		Commercial	4,270,000	4,460,000	4,860,000	5,000,000	5,050,000
Non-MSW			4,460,000	4,950,000	4,970,000	4,650,000	4,890,000
		C&D	4,270,000	4,700,000	4,480,000	4,540,000	4,820,000
		Other	190,000	250,000	490,000	110,000	70,000
Diversion			**5,960,000**	**6,590,000**	**6,200,000**	**6,440,000**	**6,790,000**
MSW			2,840,000	3,070,000	2,700,000	2,780,000	2,610,000
	Residential Recycling		500,000	510,000	470,000	520,000	520,000
	Commercial Recycling		1,220,000	1,440,000	1,640,000	1,640,000	1,400,000
	Residential Composting		350,000	350,000	340,000	340,000	330,000
	Commercial Composting		220,000	220,000	250,000	280,000	360,000
Non-MSW			3,120,000	3,520,000	3,800,000	3,660,000	4,180,000
		C&D	3,120,000	3,520,000	3,500,000	3,150,000	3,590,000
	Other C&D Diversion				300,000	510,000	590,000
Disposal			**6,430,000**	**6,510,000**	**6,460,000**	**6,340,000**	**6,450,000**
	Landfill		2,260,000	2,020,000	1,760,000	1,710,000	1,790,000
		MSW	1,060,000	960,000	1,010,000	1,030,000	1,210,000
		C&D	1,070,000	920,000	660,000	620,000	520,000
		Other	140,000	140,000	90,000	60,000	60,000
	Combustion		3,140,000	2,940,000	3,070,000	3,130,000	3,090,000
		MSW	3,130,000	2,940,000	3,060,000	3,130,000	3,080,000
		Non-MSW	*0	*0	*0	*0	*0
	Net Exports		*1,030,000*	*1,550,000*	*1,630,000*	*1,500,000*	*1,570,000*
		Exports	*1,210,000*	*1,650,000*	*1,770,000*	*1,690,000*	*1,830,000*
		Imports	*180,000*	*100,000*	*140,000*	*190,000*	*250,000*

*Non-MSW combustion was less than 5,000 tons
For 2000, 2001, and 2002 total generation includes "other C&D Diversion" tonnage that was not included in previous years.
Note: Numbers do not all add exactly due to rounding.

Figure 1 Waste Reduction and Recyling Rate Calculations (in Thousands of Tons)



In 2002, potential generation was 14.5 million tons. This is a calculated figure used to estimate what generation would be without source reduction. DEP uses a method similar to that used by the U.S. Environmental Protection Agency to calculate potential generation and, thereby, source reduction[12]. Source reduction was approximately 1.29 million tons in 2002.

In 2002, 13.2 million tons of solid waste were *actually* generated in Massachusetts. Of this amount, 8.4 million tons were MSW (63%) and 4.9 million tons were Non-MSW (37%). Between 2001 and 2002, total waste generation increased 3%, from 12.8 million tons to 13.2 million tons. This compares to a 1% decrease in generation from 2000 to 2001. Of the 13.2 million tons generated, 6.8 million tons (51%) were diverted (includes recycling, composting, and other diversion) and 6.5 million tons (49%) were disposed.

The amount of total waste requiring disposal increased by 2% from 2001 to 2002. 4.9 million tons (36%) of total waste generated were disposed in-state either by landfilling (28% of disposal) or by combustion (48% of disposal). In 2002, there were 21 landfills and 7 combustors operating in the state that received MSW and/or Non-MSW. The combustion facilities produce approximately 200 megawatts of electricity each year. The state exported for disposal 1.8 million tons and imported 0.25 million tons, and thus was a net exporter of 1.6 million tons (12%) of total waste generated. See Table 16 and 17 on page 19 for more detailed import/export data by state.

Figure 2
Total Solid Waste Generation in 2002

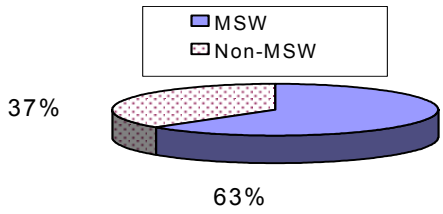


Table 4 shows the calculation of total waste reduction in 2002. Waste reduction is the combined effect of source reduction, recycling, and other C&D diversion as a percentage of *potential* waste generation. The 45 percent recycling rate shown below is lower than the overall 47 percent recycling rate because it is based on potential, rather than actual, generation. This table shows that, while recycling currently comprises most waste reduction tonnage, source reduction also plays an important role.

Table 4 **2002 Total Waste Reduction (in tons)**	
Potential Generation without Source Reduction	14,440,000
Source Reduction	1,290,000
% of potential generation	*9%*
Recycling*	6,200,000
% of potential generation	*45%*
C&D Other Diversion	590,000
% of potential generation	*4%*
Total Waste Reduction	8,070,000
% of potential generation	*56%*
* The recycling rate is 47% when based on *actual* generation. Note: Percentages do not add exactly due to rounding.	

[12] See page 3-7 of the Beyond 2000 Solid Waste Master Plan; see also EPA's National Source Reduction Characterization Report, November 1999.

Municipal Solid Waste Management

In 2002, 8.4 million tons of MSW were generated in Massachusetts, or 7.1 pounds per person per day. Of this amount, 31% was recycled (including off-site composting, but excluding on-site backyard composting)[13], which is a decrease from 34% in 2001. This decrease may have been due businesses cutting back on recycling programs due to depressed markets for some recyclables in 2002. The per capita MSW recycling rate was 2.2 pounds per person per day, and the per capita disposal rate (including export) was 4.9 pounds per person per day. The residential recycling rate (excluding home composting) was 26% and the commercial recycling rate was 35%.

Table 5
How MSW was managed in 2000 and 2001

	2001	2002
Recycled	34%	31%
Combusted	38%	37%
Landfilled	13%	15%
Net Exported	15%	17%

Between 2001 and 2002

- MSW generation increased 3%, from 8.1 million tons to 8.4 million tons. Per capita MSW generation rose from 7.0 pounds per person per day to 7.1 pounds per person per day.
- Residential MSW generation increased from 3.1 million tons to 3.3 million tons, while commercial MSW generation increased 1% from 5 million tons to 5.1 million tons.
- MSW recycling decreased from 2.7 million tons to 2.6 million tons.
- Total MSW disposal (disposal in-state and exported out of state for disposal) increased 8% from 5.3 million tons to 5.7 million tons.
- MSW net exports for disposal increased 22%, from 1.2 million tons to 1.5 million tons.

[13] When backyard composting is included, as DEP has reported in the past, the MSW recycling rate is 36%.

Figure 3
Breakdown of MSW Materials Recycled in 2002
(excluding composting)

Total Materials Recycled: 1.9 million tons

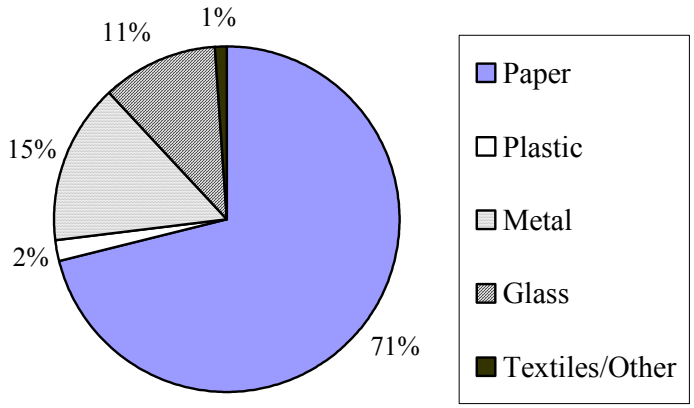


Table 6 shows the calculation of MSW waste reduction in 2002. Waste reduction is the combined effect of source reduction and recycling as a percentage of *potential* waste generation.

Table 6 **2002 MSW Waste Reduction (in tons)**	
Potential MSW Generation without Source Reduction	9,260,000
Source Reduction *% of potential generation*	900,000 *11%*
Recycling* *% of potential generation*	2,620,000 *29%*
Total Waste Reduction *% of potential generation*	3,570,000 *39%*
*The recycling rate is 31% when based on *actual* MSW generation Note: percentages do not add exactly due to rounding.	

Municipal recycling rates by year are shown in Table 7. This table shows that the distribution of municipal recycling rates has not changed substantially over the past five years. Please note that DEP did not collect FY02 municipal recycling data because we switched to a calendar year datasheet time frame to match other solid waste reporting.

Table 7 **Municipal Recycling Rates**					
Municipalities Achieving:	**FY98**	**FY99**	**FY2000**	**FY2001**	**CY 2002**
>30%	181	182	162	182	181
20-29%	90	82	68	73	61
10-19%	46	43	40	34	41
5-9%	11	13	2	7	5
Not included due to incomplete or missing data	23	31	79	55	63

Non-MSW Waste Management

In 2001, DEP added a new category of C&D Other Diversion to account for materials such as C&D fines and wood for fuel being used for beneficial uses. In 2002, an additional material - C&D residuals - was added to account for materials that were being used for grading and shaping at landfill closure projects that began in 2002. This tonnage is counted as generation, but not as recycling or disposal since use of these materials are not considered to be recycling or disposal activities. However, these activities are considered diversion since they divert material from disposal and free up capacity for other materials.

In 2002, 4.9 million tons of C&D were generated in Massachusetts, up from 4.6 million tons in 2001. Of the amount generated, 75% was recycled in 2002, up from 69% recycled in 2001. Including C&D Other Diversion with recycling, the overall C&D diversion rate was 87%. Table 8 shows how C&D was managed in 2002 compared with 2001.

Table 8
C&D Management in 2002

	2001	2002
Generated	4,550,000	4,860,000
Disposed	890,000	620,000
• **In-State**	620,000	520,000
• **Out-of-State**	270,000	100,000
Diverted	3,660,000	4,160,000
• **Recycled**	3,200,000	3,590,000
o ***Asphalt, Brick, and Concrete (ABC)***	2,830,000	3,280,000
o ***Metal***	80,000	50,000
o ***C&D wood***	40,000	40,000
o ***Wood Waste***	180,000	110,000
o ***Other****	60,000	140,000
• **C&D Other Diversion**	520,000	590,000
o **C&D Fines**	380,000	400,000
o **C&D Wood for Fuel**	140,000	130,000
o **C&D Residuals**	0	60,000

*Other materials include ceiling tiles, carpet, gypsum wallboard, and asphalt roofing shingles.

Table 9 shows the calculation of non-MSW waste reduction in 2002. Waste reduction is the combined effect of recycling, source reduction, and other C&D diversion as a percentage of *potential* generation.

Table 9 2002 Non-MSW Waste Reduction (in tons)	
Potential generation without source reduction	5,180,000
Source Reduction	330,000
% of potential generation	*6%*
Recycling*	3,590,000
% of potential generation	*69%*
C&D Other Diversion	590,000
% of potential generation	*11%*
Total Waste Reduction	4,500,000
% of potential generation	*86%*
* The recycling rate is 75% based on *actual* generation. Note: percentages do not add exactly due to rounding.	

Other Non-MSW Management

A relatively small amount of non-MSW materials other than C&D are disposed in Massachusetts landfills or sent out of state for disposal each year. In 2002, 63,000 tons of these materials were disposed, including asbestos, industrial waste, medical waste, wood waste, ash and sludge.

In addition, a significant amount of other non-MSW materials are managed each year in management systems that have in the past been tracked separately from the primary MSW/C&D waste management system. These include MSW combustion ash disposal, use of materials as alternative daily cover at landfills (both active and inactive), and other beneficial uses of materials in non-landfill applications.

Materials Used for Daily Cover

Table 10 shows materials used as daily cover at landfills.

Table 10 Reported Daily Cover Material at Active Landfills (in tons)[14]			
	2000	**2001**	**2002**
ASR	160,000	120,000	120,000
Soil Sand	500,000	420,000	270,000
Contaminated Soils	300,000	260,000	180,000
C&D Fines	210,000	190,000	230,000
Other Materials[15]	240,000	280,000	310,000
TOTAL	1,370,000	1,280,000	1,100,000

Municipal Waste Combustor Ash

There are currently seven waste-to-energy combustors operating in Massachusetts. In 2002, these combustors generated approximately 700,000 tons of combustion ash (excluding recovered post-burn metals). The majority of the ash was disposed in six[16] MSW combustion ash mono-fills located in Massachusetts. A number of these mono-

[14] Daily Cover tonnages have been revised for consistency across time, and do not include material disposed at Quarry Hills, since this is not an active landfill.
[15] "Other Materials" includes approximately 20 various materials such as ground asphalt and DPW wastes.
[16] One of the 7 waste-to-energy combustors sends its combustion ash out of state.

fills are nearing their capacity, and efforts are underway by a number of combustors to expand capacity. The current status of these ash landfills is summarized in Table 11.

Table 11
Active MSW Combustion Ash Landfills

Municipality	Site Name	Current Permit Expires
Agawam	Bondi's Island Ash Landfill	2004
Peabody	Peabody Ash Landfill	2006
Saugus	Wheelabrator Ash Landfill	2007
Shrewsbury	Shrewsbury Ash Landfill	2008
Haverhill	Ward Hill Neck Ash Landfill	2009
Carver	CMW Ash Landfill	2013

Waste Management Capacity Projections

In the *Beyond 2000 Solid Waste Master Plan*, EOEA and DEP established a policy goal of achieving no net import or export of solid waste by 2006. Under this policy, DEP would permit additional landfill disposal capacity up to, but not beyond, the amount of waste requiring disposal. Given planned landfill projects, it is clear that Massachusetts will not reach a no net import/export level by 2006. This is likely due to solid waste market conditions as well as the difficulty of siting new capacity in Massachusetts. Since the 2001 Progress Report was issued, DEP permitted approximately 1.3 million tons of capacity through existing landfill expansions, however 90,000 tons per year was lost due to the Fall River landfill decreasing its capacity to address its potential closure. Where waste is ultimately disposed is determined by a number of factors, including available disposal capacity and regional market conditions. DEP continues to entertain proposals for local disposal capacity. However, where competitively priced out-of-state disposal capacity exists, waste management companies and municipalities may choose to rely on this capacity and not seek to develop in-state capacity at this time. DEP will continue to monitor waste management capacity as the state implements and evaluates the strategies in the *Master Plan*.

Table 12 shows projected waste management capacity through 2010, using a baseline of 2002 solid waste data and the assumptions that MSW and C&D generation will increase 2% per year, MSW recycling will increase approximately 0.45% per year (based on the historical average from 1994-2002), C&D Diversion will increase 0.55% per year (based on the historical average from 1994 – 2002). Net Exports are projected to fluctuate throughout the decade due to changes in landfill capacity over time. Table 13 lists active and proposed landfill projects known to DEP. Unshaded numbers reflect currently permitted capacity. Shaded numbers reflect potential additional capacity that could be constructed based on existing facility plans, but is not yet permitted.

Table 12

Waste Management Capacity Projections

	2002 Actual	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Generation	**13,239,255**	**13,436,720**	**13,705,455**	**13,979,564**	**14,259,155**	**14,259,155**	**14,835,225**	**15,131,930**	**15,434,568**	**15,743,260**	**16,058,125**
MSW	8,353,966	8,521,046	8,691,467	8,865,296	9,042,602	9,223,454	9,407,923	9,596,081	9,788,003	9,983,763	10,183,438
Non-MSW	4,819,289	4,915,675	5,013,988	5,114,268	5,216,553	5,320,884	5,427,302	5,535,848	5,646,565	5,759,496	5,874,686
Total Diversion	**6,787,175**	**6,866,091**	**7,040,984**	**7,220,300**	**7,404,149**	**7,592,647**	**7,785,910**	**7,984,059**	**8,187,218**	**8,395,512**	**8,609,072**
	51%	**51%**	**51%**	**52%**	**52%**	**53%**	**52%**	**53%**	**53%**	**53%**	**54%**
MSW Rate	31%	31%	31%	31%	32%	32%	32%	32%	32%	32%	32%
MSW	2,607,629	2,653,411	2,718,658	2,785,510	2,854,006	2,924,186	2,996,092	3,069,766	3,145,251	3,222,593	3,301,836
C&D DiversionRate	87%	87.5%	88.0%	88.4%	88.9%	89.4%	89.9%	90.4%	90.9%	91.4%	91.9%
C&D Diversion	4,179,546	4,212,680	4,322,326	4,434,790	4,550,143	4,668,461	4,789,818	4,914,294	5,041,967	5,172,920	5,307,236
Combustion Capacity**	**3,088,443**	**3,132,612**	**3,132,612**	**3,132,612**	**3,132,612**	**3,132,612**	**3,132,612**	**3,132,612**	**3,132,612**	**3,132,612**	**3,132,612**
Total Potential LF Capacity	**2,204,458**	**2,296,810**	**2,481,882**	**2,479,382**	**2,383,782**	**2,382,949**	**2,382,949**	**2,262,829**	**1,956,829**	**1,582,557**	**1,447,352**
Total In-state Management Capacity	**11,665,024**	**12,295,513**	**12,655,478**	**12,832,294**	**12,920,543**	**13,108,208**	**13,301,471**	**13,379,500**	**13,276,659**	**13,110,681**	**13,189,036**
Net Export*	**1,574,231**	**1,141,207**	**1,049,976**	**1,147,270**	**1,338,612**	**1,150,948**	**1,533,754**	**1,752,429**	**2,157,909**	**2,632,578**	**2,869,088**

Assumptions:

1) Generation increase 2.0% per year

2) MSW Recycling Rate increases 0.45% per year

3) C&D Diversion Rate increases at 0.55% per year

4) In calculating C&D diversion, 66,000 tons of other non-MSW is subtracted from the non-MSW generation figure, so that this tonnage reflects C&D diversion only.

* Net export is calculated by subtracting Total In-State Management Capacity from Total Generation. Total In-State Management Capacity is the sum of Total Diversion, Combustion Capacity and Total Potential Landfill Capacity

** In 2002, combustion capacity was lower than normal; therefore 2001 combustion capacity is used to project future years. accurate tonnage figure for long term projections.

Table 13
Projected Landfill Capacity (Tons Per Year)

Town	2002 Permitted Capacity	End of current permit	Lifetime of LF	Proposed change in tonnage	date of proposed change going online	new tonnage after new capacity	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Active Landfills																		
Barre	93600	2007	**2013**	0	0	93600	93600	93600	93600	93600	93600	93600	93600	93600	93600	93600	93600	93600
Bourne	146000	2008	**2024**	72000	2004	218000	146000	146000	218000	218000	218000	218000	218000	218000	218000	218000	218000	218000
Carver	97982	2013	**2013**	0	0	97982	97982	97982	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000
Chicopee	365000	2009	**2012**	0	0	365000	365000	365000	365000	365000	365000	365000	365000	365000	365000	365000	365000	0
Chilmark	2500	2004	**2004**	0	0	2500	2500	2500	2500	0	0	0	0	0	0	0	0	0
Dartmouth	115000	2016	**2021**	0	0	115000	115000	115000	115000	115000	115000	115000	115000	115000	115000	115000	115000	115000
Fall River*	468000	2004	**2009**	-162000	2004	306000	468000	468000	306000	306000	306000	306000	306000	306000	0	0	0	0
Gardner	93600	2005	**2005**	0	0	93600	93600	93600	93600	93600	0	0	0	0	0	0	0	0
Granby	146000	2008	**2010**	89000	2005	235000	146000	146000	146000	235000	235000	235000	235000	235000	235000	0	0	0
Hardwick	93600	2010	**2010**	0	0	93600	93600	93600	93600	93600	93600	93600	93600	93600	93600	0	0	0
Hull	833	2006	**2006**	0	0	833	833	833	833	833	833	0	0	0	0	0	0	0
Middleborough	9620	2011	**2011**	0	0	9620	9620	9620	9620	9620	9620	9620	9620	9620	9620	9620	0	0
Nantucket	30000	2015	**2015**	0	0	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000
Northampton	50000	2007	**2017**	0	0	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
South Hadley	0		**2016**	123240	2003	123240	0	123240	123240	123240	123240	123240	123240	123240	123240	123240	123240	123240
Southbridge	180960	2019	**2019**	0	0	180960	180960	180960	180960	180960	180960	180960	180960	180960	180960	180960	180960	180960
Sturbridge	410	2016	**2016**	0	0	410	410	410	410	410	410	410	410	410	410	410	410	410
Taunton	120120	2006	**2008**	0	0	120120	120120	120120	120120	120120	120120	120120	120120	0	0	0	0	0
Warren	2000	2005	**2005**	0	0	2000	2000	2000	2000	2000	0	0	0	0	0	0	0	0
Wayland	2345	2005	**2011**	0	0	2345	2345	2345	2345	2345	2345	2345	2345	2345	2345	2345	0	0
Westminster	156000	2004	**2025**	140400	2005	296400	156000	156000	156000	296400	296400	296400	296400	296400	296400	296400	296400	296400
TOTAL PERMITTED CAPACITY							**2,204,458**	**2,079,970**	**2,347,210**	**1,831,310**	**1,733,365**	**1,612,412**	**1,468,812**	**1,015,812**	**650,812**	**557,212**	**424,352**	**424,352**
Net Export							**1,574,231**	**1,358,047**	**1,184,648**	**1,795,342**	**1,989,029**	**1,921,485**	**2,447,891**	**2,999,446**	**3,463,926**	**3,657,923**	**3,892,088**	**3,994,292**
TOTAL POTENTIAL CAPACITY							**2,173,570**	**2,296,810**	**2,481,882**	**2,479,382**	**2,383,782**	**2,382,949**	**2,382,949**	**2,262,829**	**1,956,829**	**1,582,557**	**1,447,352**	**1,082,352**
Net Export							**1,574,231**	**1,141,207**	**1,049,976**	**1,147,270**	**1,338,612**	**1,150,948**	**1,533,754**	**1,752,429**	**2,157,909**	**2,632,578**	**2,869,088**	**3,336,292**

KEY:

Permitted Capacity — number without shading

Potential Additional Capacity — number with shading

* DEP issued an Authorization to Construct the next phase of cells at Fall River; however, the city revoked the landfill's Site Assignment. BFI appealed the city's action, and the court ruled in favor of BFI. Construction of the cells has begun, but the city is appealing the court's decision, so it is uncertain when or if this potential capacity will go online.

Tables 14 and 15 below show solid waste export and import data by state. The export and import data for Massachusetts was collected from annual facility reports (AFR) submitted to DEP, a report on interstate solid waste flow prepared by the Northeast Waste Management Officials Association (NEWMOA) and from calling other states directly. In some instances, the export data provided in the AFR differed from that reported from the states. In order to make the most conservative estimate of export, the higher number from the two sources was used. For example, if in the Massachusetts AFR, it was reported that Massachusetts sent Connecticut 10,000 tons of MSW, and Connecticut reported receiving 29,000 tons of MSW, 29,000 tons was used.

Table 14
Solid Waste Export Data by Receiving State

Waste Class	CT	ME	NH	NY	OH	PA	RI	SC	VA	VT	TOTALS
C&D	18,452	49,414	4,991	60,508	138,398	474	2,631	0	0	300	275,168
MSW	40,168	290,977	318,129	380,000	98,253	14,375	32	401,318	1,785	0	1,545,037
Non MSW	0	0	0	4,281	0	0	2,296	0	0	0	6,577

Table 15
Solid Waste Import Data by Sending State

Waste Class	CT	ME	NH	NY	OH	PA	RI	SC	VA	VT	Canada	TOTALS
C&D	132,051	12,690	5,481	2,517	0	0	736	0	0	24	0	150,982
MSW	24,320	8,759	25,483	8,883	0	0	14,438	0	0	4,924	978	87,785
Non MSW	5,783	920	1,172	0	0	0	552	0	0	14	0	8,441

Tables 16 and 17 below detail all solid waste that was accepted and diverted through Massachusetts Transfer Stations in 2002. This data is different from the import/export data reported above as it includes waste that was generated and disposed in Massachusetts in addition to the waste that was imported and exported. This data indicates the significant role that transfer stations play in managing Massachusetts' waste.

Table 16
Transfer Stations - Waste Accepted
(rounded to nearest 1,000 tons)

Waste Class	Total Waste Accepted (Tons)
MSW	2,207,000
C&D	1,355,000
MSW Recycling	167,000
Non-MSW	36,000
Sludge	25,000

Table 17
Transfer Stations – Waste Diverted
(rounded to nearest 1,000 tons)

State	Total Sent for Diversion (Tons)
MA	782,000
RI	46,000
NH	35,000
ME	17,000
NY	7,000
VT	1,000
CN	1,000
MS, CT, NJ, PA	Less than 100 tons each

Section 2: FY04 Waste Reduction and Oversight Program Update

This section reports on the Department of Environmental Protection's (DEP's) waste reduction and waste oversight accomplishments and activities for fiscal year 2004 (FY04, July 2003 through June 2004). In FY04, waste reduction programs received $3.5 million of state funding. While this funding level was reduced from FY03 and was considerably lower than in FY02, it enabled DEP to sustain and even build on a number of important waste reduction programs.

In light of state and local budget cuts, DEP is focusing on strategies that seek to increase efficiency, reduce costs, leverage other resources, and build partnerships. DEP will establish an FY05 implementation plan in Fall 2004, once the state budget and FY05 staffing levels have been set.

Source Reduction

In the *Beyond 2000 Master Plan*, EOEA and DEP placed an increased emphasis on source reduction. Source reduction refers to the design, manufacture, purchase or reuse of materials to reduce the quantity of material that is generated. By minimizing the amount of materials produced and used in the first place, source reduction is the most environmentally preferable strategy for reducing waste disposal. In addition to reducing the burden on the waste disposal infrastructure, source reduction also reduces the burden on the recycling infrastructure and prevents the consumption of natural resources. FY04 source reduction initiatives are described below within the categories of Municipal Waste Reduction and Commercial Waste Reduction.

Product Stewardship

As envisioned in the *Master Plan*, Product Stewardship refers to the concept that all parties responsible for the design, production, sale, and use of a product share responsibility for the full environmental impacts of the product throughout its life cycle. A key tenet of product stewardship is that manufacturers in particular should take greater responsibility for reducing product impacts. By placing greater responsibility for the end costs of products on manufacturers, product stewardship gives manufacturers strong economic incentives to change how they design and manufacture products, making them less toxic and more recyclable, and enabling consumers to make better informed purchasing choices by internalizing the costs of consumer products. FY04 product stewardship accomplishments include:

- **National Carpet Product Stewardship Agreement** – DEP staff continued to work with other states and the carpet industry to foster the development of the Carpet America Recovery Effort (CARE). CARE is the industry-led organization responsible for achieving the goals of the national carpet agreement, signed in 2002. This included a $40,000 CARE grant made in April 2004 for carpet collection (one of three national grants awarded) to Environmental Recovery and Consolidation Services of North Reading. At CARE's annual meeting in April 2004, DEP provided two presentations and moderated a workshop. According to CARE's 2003 annual report, nationally, 93.7 million pounds of post-consumer carpet was diverted from landfills in 2003, with 86.6 million pounds being recycled. This represents an 87 percent increase in diversion and a 64 percent increase in recycling from 2002.

- **Electronics Product Stewardship** – Massachusetts continues to participate with the Product Stewardship Institute (PSI) in the National Electronics Product Stewardship Initiative (NEPSI). PSI coordinates the participation of over twenty states in this dialogue, including Massachusetts.

NEPSI engages the electronics industry and other stakeholders in a product stewardship dialogue that aims to create a collection and recycling model where costs are shared by industry, government, and consumers. DEP helped secure a $50,000 grant from the Electronics Industry Alliance to assist two Massachusetts Goodwill facilities with computer and TV recycling programs. The funds are being used to collect data on a collection model for residential electronics.

- **Bottle Bill** – DEP administered redemption center registrations and developed policy recommendations in support of Governor Romney's proposal to expand the bottle bill. DEP continued to work with various stakeholders, including redemption centers, distributors, and retailers to handle issues regarding implementation of the bottle bill. DEP also administered the Redemption Center Grant program.

- **Paint Product Stewardship** -- DEP participated with PSI in the National Paint Product Stewardship Initiative that was initiated in December 2003. DEP served on two subcommittees of the dialogue, including the Deposit Workgroup and the Financing Workgroup. In addition, DEP worked with Benjamin Moore and the Product Stewardship Institute to expand Benjamin Moore's program to take back Benjamin Moore paint from paint collection events from five Massachusetts towns (Attleboro, Needham, Newton, Medford, and Milford).

- **Other Product Stewardship Dialogues** – DEP participated in discussions with manufacturers on pilot programs to take back gypsum wallboard, electronics, and propane tanks for recycling.

Hazardous Products Reduction Programs

In addition to establishing a waste reduction goal for reducing the amount of materials disposed, the *Master Plan* also establishes goals related to reducing the toxicity of the waste stream. The goal established in the *Master Plan* is to "Substantially reduce the use and toxicity of hazardous products and provide convenient collection services to all residents and very small quantity hazardous waste generators." FY04 hazardous products reduction accomplishments include:

- **Municipal Collection Programs** – Due to FY04 funding limitations, DEP did not offer grants for used motor oil tanks, surplus paint storage equipment and universal waste storage sheds for the first time since FY95. However, DEP did support various initiatives that contributed to a more cost efficient collection system for household hazardous products (HHP) at local and regional levels, including:
    - With many municipalities cutting back on HHP events in FY04, DEP focused on creating more sustainable regional collection models. This included assistance to develop regional collection programs that provide shared collection opportunities to residents of multiple towns and bidding out hazardous waste collection services on behalf of regional groups.
    - DEP re-bid the statewide contract for collection of HHP.
    - DEP provided three technical assistance grants to organize new regional HHP collection systems, which will serve 10 communities with a total population of 193,600.
    - DEP continued to staff the Household Hazardous Waste (HHW) hotline, answering calls from residents about proper disposal of HHP, environmentally friendly product alternatives, and other HHP issues.
- **Mercury Elimination Strategy** – This strategy was developed by Massachusetts and the Northeast Regional Mercury Task Force of the NEG-ECP to reduce mercury emissions into both the Commonwealth's and northeastern region's air sheds. FY04 activities included:

- DEP staff participated in state, regional, and national task forces and workgroups to implement consistent and comprehensive national, regional, and state Mercury Elimination Strategies that address both comprehensive and sector-specific mercury reduction legislation, sector specific reduction programs, and development of short/ long-term national mercury retirement plans. Mercury emission reductions were cut by 50% regionally (achieving the Task Force's interim goal) and were cut by more than 60% in the state. In Massachusetts, the Task Force adopted a second interim goal to achieve a 75% reduction by 2010.
- DEP worked with hospitals through onsite audits to educate them and to implement policy changes concerning solid, hazardous, and infectious waste management and pollution prevention measures. In particular, DEP strongly encouraged hospitals to reduce the use of mercury and PVC containing products, and institute safe collection, labeling, and recycling practices for unneeded mercury and PVC containing products.
- DEP worked with the Massachusetts Dental Society and dental offices to develop and implement a plan for dental offices to install amalgam separators, recycle all mercury-containing materials, and adopt best management practices voluntarily. Unless 50% of MA dentists adopt these measures by January 30, 2005, DEP will implement the measures by regulation.
- DEP worked to promote thermostat collection programs through the support of NEWMOA and coordination with municipal waste combustion facilities and utilities resulting in the collection of more than 3,000 thermostats. In addition, DEP is participating in a Northeast Waste Management Officials Association (NEWMOA)/EPA project to develop and promote business fluorescent lamp recycling.
- DEP provided a technical assistance grant to the South Central Recycling Association of Massachusetts for mercury audits, clean-outs and purchase of mercury-free replacement products at East Longmeadow High School and the Southwick School District.
- DEP continued to perform oversight of municipal waste combustor Material Separation Plans. The mercury product diversion efforts made through these plans included:
  - a mercury awareness campaign;
  - thermometer swaps that captured more than 20,000 mercury thermometers;
  - outreach to contractors on thermostat collection that yielded more than 3,000 thermostats;
  - reimbursements to municipal collection programs that collected 400,000 linear feet of fluorescent lamps and other mercury containing devices (and elemental mercury) estimated to contain between 250 and 300 kilograms of mercury;
  - Adoption of 26 municipal ordinances banning the disposal of mercury bearing items; and
  - Continued DEP staffing of the Mercury Hotline, answering calls from residents about proper disposal of mercury, mercury spills, etc.

- **School Chemical Management –** DEP provided six grants to fund school chemical cleanouts in FY04; four of the six will have a clean-out of chemicals done by June 30. DEP provided in-depth assistance to schools to develop environmental health and safety teams, engage school, municipal and fire officials, and adopt policies to prevent excess purchase and unsafe storage of chemicals in the future. DEP participated in the Multi Agency Task Force on Schools to coordinate efforts among multiple federal, state, and local agencies on improving environmental health and safety in schools.
- **Workshops on Pesticide and Fertilizer Reduction -** DEP offered a new municipal grant this year: workshops on Healthy Lawns and Landscapes. Eight workshops were given in Spring 2004, focusing on increasing the overall health of lawns and landscapes by building soil health and using best management practices which reduce or eliminate the need for irrigation, pesticides

and fertilizers. More than 230 residents attended and 35 committed to reduce or eliminate their use of pesticides and signed up to receive "Pesticide Free" lawn signs. DEP received very positive feedback on these workshops.

Municipal Waste Reduction

In FY03, DEP provided recycling equipment, education, and technical assistance grants to municipalities and regional groups. More information on these grants is provided below and in other sections of this update.

- **Pay-As-You-Throw (PAYT) Grants and Technical Assistance** – PAYT has proven to be successful at increasing recycling, reducing waste, and saving municipalities money. A total of 107 Massachusetts communities now have PAYT. Other PAYT assistance included:
    - Provided two PAYT grants in the form of funding for printing and mailing educational materials to residents.
    - Provided hands-on technical assistance grants through DEP staff and MRIP Coordinators to 15 municipalities to assist in cost/benefit analyses, strategic planning, education and outreach and implementation of PAYT.
    - Worked to provide information and guidance to more than 16 additional municipalities that are considering PAYT.
    - Presented 3 workshops for municipal officials on PAYT and a fourth workshop geared for recycling and solid waste committee volunteers.
    - Participated in 8 media interviews about PAYT, including the provision of an article on PAYT programs for the Department of Revenue's City & Town electronic bulletin (bulletin is received by over 5,000 recipients).
    - Issued an updated, comprehensive Implementation Guide for PAYT and posted it on the web site for the first time. A separate companion document, which includes case studies, sample implementation plans, and other useful program start-up materials was also issued.

- **Municipal Technical Assistance, Workshops and Training** – DEP expanded assistance from DEP staff and MRIP Coordinators to municipalities and regional groups to help build local recycling capacity and provide information on increasing commercial and residential waste reduction. FY04 accomplishments included:
    - DEP held the Annual Waste Reduction Forum in January 2004. The event included 12 workshops and a plenary session in which the mayors of Worcester, Brockton and Newton described innovative municipal waste reduction and sustainability initiatives. While most workshops addressed waste reduction, for the first time the agenda included sustainability and climate change workshops on topics such as landscaping, reducing diesel exhaust and energy conservation. Sponsorships were secured from several vendors to cover the cost of lunch for all attendees.
    - Conducted a series of workshops (some of these workshops are also described elsewhere in this document) throughout the Commonwealth on various solid waste management issues including: source reduction in municipal operations, backyard and municipal composting, pesticide use reduction, commercial recycling workshops for municipalities, sustainable communities, and Pay-As-You-Throw.
    - Funded 22 technical assistance projects for a variety of pilot programs and regional waste reduction initiatives that benefited over 1,120,000 residents in municipalities or regional groups. These grants included funds for program development, in-kind awards of dedicated staff time (MRIP coordinators or DEP staff), and a combination of both.

- **Municipal Recycling Equipment Grants** – DEP provided limited recycling equipment grants of wheeled carts for multi-family, schools and business recycling programs, kitchen food waste collection containers, recycling bin stickers, and public space recycling baskets.

- **Education and Outreach** - In an effort to maximize the reach of limited resources, DEP offered a new consumer education grant to cover the cost of mailing a recycling information brochure designed and printed by a municipality. This enabled DEP to assist more municipalities, instead of paying for a limited number of all-inclusive education grants (where DEP pays for the design, printing and mailing of recycling information to town residents).

- **School Green Team –** DEP launched its third year of the Green Team, an environmental club for Massachusetts schools that provides fun and interactive ways for students and teachers to reduce, reuse, recycle, and compost in their classrooms, schools, homes, and communities. 151 schools representing nearly 30,000 students participated. Four new school recycling programs were started and eight others were expanded. DEP supported these programs with grants for recycling bins, carts, and compost bins.

- **Home Composting Grant Program** – Home composting is one of the major ways that DEP supports residential source reduction. During FY04 DEP provided home composting bin grants to three municipalities starting new programs and 16 communities that had not received bins since 1997 or earlier. In addition, DEP awarded grants for 2,500 kitchen scrap buckets, a new home composting grant item to increase home composting of food waste. Eight home composting workshops were presented to approximately 240 people in FY04.

- **Junk Mail Reduction Kits** - DEP evaluated responses to junk mail reduction kits received from residents of municipalities that were awarded the kits. Of more than 3,000 responses, nearly all reported that they mailed in cards to remove their names from mailing lists and stated that they would recycle junk mail. More than half contacted credit card companies to have their names removed from mailing lists and nearly half called to cancel catalog descriptions. While funding limitations prevented DEP from printing additional kits, DEP provided the design for this kit to allow municipalities to print and distribute additional kits.

- **Surplus Equipment Distribution** - DEP developed a new initiative to get quality surplus state property into the hands of municipalities, public schools and non-profit organizations. The municipal program is also working with the Northeast Recycling Council on an EPA-funded grant to research the capacity of materials exchanges and surplus property systems to match reusable materials and finished goods between suppliers and customers. DEP has conducted outreach to the Massachusetts Association of School Business Officials (MASBO), the National Association of Housing Rehabilitation Officials (NAHRO), the Massachusetts Government Finance Officers Association (MA GFOA), and the Massachusetts Municipal Association (MMA) to develop a network of municipal officials interested in available surplus property. DEP also assisted in the development of a regional survey that NERC and other northeastern states have distributed. DEP has already facilitated several exchanges that have saved municipalities thousands of dollars in equipment costs.

Commercial and Institutional Waste Reduction

- **DEP Business Waste Reduction Assistance** – DEP implemented a number of initiatives in this area, including:

- Worked with municipalities and MRIP Coordinators to establish business recycling partnerships in nine municipalities.
- Developed model contract language for municipal business recycling programs.
- Advanced the partnership with EPA and its national WasteWise recognition and assistance program, and gave out the first joint DEP/EPA WasteWise award for leadership in recycling of building materials. DEP also plans to give out awards to supermarkets involved in the Supermarket Organics Recycling Network.
- Provided limited grants to businesses, municipalities, and non-profit organizations promoting commercial recycling.
- Supported the implementation of Resource Management (RM) contracting at Shattuck Hospital. This innovative solid waste and recycling contracting approach creates shared incentives for waste reduction for both business generators and RM service providers.
- Partnered with Earth 911 and Staples, Inc., to develop the Massachusetts Earth 911 Business Website and Recycling Locator as a prototype for a national website. This site (www.Earth911Business.com) provides small- and medium-sized businesses with a ZIP Code-specific Locator to easily find:
  - Local recycling service providers;
  - An expansive list of source reduction, reuse, and recycling suggestions;
  - Guidelines on how to create a waste reduction plan, how to conduct a waste assessment, and set up an office recycling program; and
  - Information on how and where to buy recycled content products.

- **WasteCap Business Assistance –** DEP funded and assisted WasteCap programs to help businesses to reduce waste and increase recycling, including:
  - Staged the Race to Recycle, a recycling competition for businesses and institutions.
  - Updated the web-based Recycling Services Directory to help businesses locate recycling companies that can serve them.
  - Staffed a telephone hotline to answer business recycling questions.
  - Revised and updated the WasteCap website.

- **Commercial and Institutional Food Waste Composting** – DEP implemented a number of programs in FY04 to increase the composting and other diversion of food waste, especially from commercial and institutional sources.
  - Continued to expand DEP's Supermarket Recycling Organics initiative, including:
    - Increased the number of participating supermarkets to more than 55.
    - Evaluated results to date at 25 supermarkets, including Roche Brothers, Stop & Shop, Shaws, Big Y, and Whole Foods stores.
    - Provided technical assistance to stores with priority needs.
    - Developed new case studies based on program evaluations.
    - Received a $16,000 grant from Region 1 EPA to support the supermarket project.
    - Signed up over 5 supermarket chains to the Massachusetts WasteWise Program – a voluntary waste reduction recognition program affiliated with US EPA's WasteWise Program. This allows DEP to give a joint state/federal award to supermarkets. Awards will be given in early October.
    - Developed a generic DEP food residual recycling brochure. This brochure is intended for haulers to give to potential customers interested in food residual recycling.
  - Assisted organic composting cooperatives through Wastecap, CET, and John Connolly and Associates.
  - Worked with the Coalition for Environmentally Responsible Conferences (CERC) to facilitate food rescue and food diversion at major events and hotels including the Four

Seasons, Sonesta, Hayatt, Bay Tower and the Copley Plaza. Two workshops were held to demonstrate food recycling programs.
    - Coordinated and managed the organics SWAC subcommittee.
    - Held DEP's Fourth Organics Recycling Summit, "Links in the Food Chain," in April 2004, which included more than 160 participants. For the first time, the facility rental and food for the event was fully funded by sponsors and exhibitors.

- **Green Team and Government Waste Reduction Programs -** This program was developed to promote more environmentally sound operations in government. FY04 accomplishments include:
    - DEP facilitated the work of the DEP Green Team and assisted in the coordination of state agency efforts with EOEA.
    - DEP implemented a Paperwork and Postage Reduction Initiative within its Boston and regional offices.
    - DEP staff represented the Department on the State Sustainability Council and Council Workgroups, including green buildings, recycling and waste reduction, and environmentally preferable products purchasing.
    - DEP received a Sustainability Grant from EOEA to purchase software and hardware to upgrade DEP's mail system. When implemented, the new "Smartmailer" system will reduce paper and postage by verifying and eliminating incorrect addresses.

Recycling Market Development Programs

As part of DEP's strategy to increase recycling and reuse, DEP has made significant investments in the State's waste reduction infrastructure by providing support to municipalities, consumers, and businesses. Many of the materials generated and collected in Massachusetts face market challenges due to economic and technical barriers. DEP and other state agencies are working to address the barriers associated with recycling market development through an array of financial and technical assistance programs. FY04 accomplishments include:

- **Recycling Industries Reimbursement Credit (RIRC)** – Provided four grants for $153,000, leveraging $270,000 in matching funds, to innovative recycling businesses to increase the demand for recyclable materials. These grants, which focused on developing processing capacity for organics and construction and demolition debris, provided capital equipment for two composting companies to manage an estimated 29,000 tons of food waste per year and for two C&D companies to mange 1,500 tons per year. FY04 activities performed by DEP staff included the designation of target materials, awarding of RIRC grants, and the tracking of past recipient efforts.

- **Recycling Loan Fund (RLF)** – One loan for $185,000 was made to a composting business.

- **State Buy Recycled and Environmentally Preferable Purchasing -** DEP continued to assist the State's Operational Services Division to increase state and municipal purchases of recycled and environmentally preferable products, coordinate with national Buy Recycled initiatives, and plan the State's Conference and Vendor Fair for Buy Recycled and Environmentally Preferable Products.

- **Resources for Recycling Businesses Web Page** – DEP developed a web page that includes listings of free web-based resources for recycling businesses.

- **Business Buy Recycled Programs –** Through WasteCap, DEP supported the Recycled Paper Purchasing Cooperative and provided other information and assistance to help businesses increase their purchases of recycled products.

Construction and Demolition Debris (C&D) Management Initiatives

- **C&D Disposal Ban** – DEP continued working with the C&D Subcommittee of the Solid Waste Advisory Committee (SWAC) to develop a recommendation on initiating a disposal ban on certain construction and demolition debris. DEP released the draft regulations and guidance for public hearings and comment in June 2004. (This is part of a broader set of solid waste proposed regulatory and guidance revisions discussed in the next section.)

- **C&D Technical Assistance Program** – This program was developed to increase the diversion of C&D materials from final disposal. FY04 accomplishments include:
    - Provided research and technical assistance to increase the reduction and recycling of C&D materials.
    - Awarded technical assistance grants and provided staff assistance to conduct C&D reuse and recycling projects, including developing C&D reuse and recycling specifications for a school renovation project and capturing residential C&D materials for reuse.
    - Completed a wood markets analysis.
    - Initiated a clean wood separation feasibility study to demonstrate that the "clean" fraction of incoming co-mingled C&D wood waste can be separated from the “dirty” (painted, etc.) fraction and then reused as mulch. Because there are no clear standards for the reuse of this material, DEP determined that the standard for reusing the C&D wood waste would be a comparison to wood that is considered exempt under solid waste regulation, such as pallets, stumps, brush, yard waste, etc. The applicant has completed the Phase I portion of the study which includes a chemical analysis of exempt, clean wood waste and a statistical analysis to determine what "baseline" to use for comparison to the C&D wood waste.
    - Completed five pilot projects demonstrating source separation techniques and measuring cost/benefits. The results of two of the pilot projects have been presented in fact sheets available on DEP’s website.

- **C&D Diversion Networking and Outreach**
    - Began the development of a new C&D section of the DEP web site.
    - Gave more than 10 presentations on the proposed C&D disposal ban.
    - Coordinated the C&D subcommittee and the efforts of six work groups.

Solid Waste Facilities and Materials Oversight

Regulatory and Policy Development

- **Solid Waste Management Facility Regulation Revisions (310 CMR 19.000) –** Finished work on revising solid waste facility permitting regulations, including provisions for landfill double liner requirements, a construction and demolition (C&D) waste ban, and revised beneficial use determination (BUD) requirements. These regulations were released for public comment in June 2004.

- **Risk Evaluation Protocol** – Completed revisions to the draft revised guidance document titled *Facility Impact Assessment Guidance Document for Solid Waste Facility Site*

Assignment and Permitting. The revised document has been released for public comment in conjunction with the draft *Solid Waste Management Facility Regulations* (310 CMR 19.000). The revised guidance makes a number of improvements and clarifications to DEP's existing guidance for risk assessment at solid waste facilities, including clarifying requirements for assessment and remediation of groundwater contamination and requirements for diesel emissions retrofits for on-site equipment. The changes are based in part on recommendations from DEP's Science Advisory Panel, which reviewed and commented on the Interim Guidance.

- **BUD Guidance** – The Draft Beneficial Use Determination Guidance was made available for public comment in conjunction with the draft *Solid Waste Management Facility Regulations* (310 CMR 19.000). The regulations provide specific standards and a clear process for submitting applications for beneficial use. The guidance provides in-depth information on how to meet the regulatory requirements. The guidance also provides numerical values for predefined exposures, which will facilitate permit application reviews when the use is commercial in nature (product specifications conform to industry accepted performance standards) or if the secondary material contains little contamination. These documents provide a roadmap for review that will assist DEP in issuing beneficial use determinations that are consistently protective and boost recycling statewide.
- **Beyond ERP: Transfer Station Initiative** – Transfer stations were selected as a pilot project as part of DEP's larger FY04 *Beyond ERP* initiative. In this project, DEP assessed current compliance and concerns among transfer stations and used this assessment to inform DEP's permitting, compliance, enforcement and other oversight activities at transfer stations. This assessment found that risks from transfer stations are generally well controlled now and that the most frequent violations include waste ban related violations and reporting, recordkeeping, and signage violations. Larger transfer stations tended to have proportionately more violations than smaller ones. DEP is in the process of developing proposed changes to transfer station permitting, compliance, and enforcement that will increase DEP's efficiency and effectiveness in overseeing and promoting greater compliance in this sector.

- **Co-compost Standards** – A cooperative effort by DEP's Solid Waste program, Water Pollution Control program and Office of Research and Standards resulted in standards for compost generated at the Town of Nantucket's co-compost facility. The feedstock for the compost is comprised of municipal wastewater treatment plant sludge ("biosolids") generated at the Nantucket-Surfside Wastewater Treatment Plant and select municipal solid waste ("MSW") received at the solid waste management facility. The compost was approved for use or sale for growing vegetation at any location. These standards will provide clear guidance for future proposed co-compost facilities in Massachusetts.

- **Hydrogen Sulfide Work** – DEP drafted guidance on evaluating health effects, conducting sampling and analysis, and controlling hydrogen sulfide (H2S) emissions from landfills for internal DEP review. DEP conducted extensive research on hydrogen sulfide gas from Massachusetts landfills that have had problems with hydrogen sulfide emissions. DEP expects to issue the final guidance document in FY05.

- **Standards for Reuse of Painted Asphalt, Brick and Concrete –** DEP began developing recommendations for the safe handling and reuse of painted asphalt, brick and concrete (ABC), especially in response to major demolition projects involving the

Division of Capital Asset Management (DCAM) that have to be completed on short timelines.

- **Overseeing Management of Metal from Combustion Facilities** - DEP, in conjunction with stakeholders, developed clarifications on regulatory requirements for metal shredding operations that handle pre-incinerator ferrous or post-incinerator ferrous generated by metal recycling activities at municipal waste combustors.

Permitting

- **Solid Waste Permitting** – Issued over 200 permits to the regulated community in calendar year 2003, including 46 Initial Site Assessments, 36 Beneficial Use Determinations, 17 Corrective Action (closure) Designs, and the approval of seven landfill Authorization to Construct or Authorization to Operate permits representing more than 1.3 million tons of annual disposal capacity.

- **Landfill Closures** – Oversaw Two landfill sites, Cottage Street in Springfield and Crow Lane in Newburyport, that started closure activities in accordance with the "Inactive Unlined Landfill Closure Guidelines" in 2003. Continued to oversee the Brockton Thatcher Street landfill closure that is scheduled for completion in 2004. Slightly contaminated soil, C&D residuals and other materials will be used to close these municipal sites at little or no cost to the community.

Compliance and Enforcement

- **Waste Ban Inspections** – Due to staff reductions through layoffs and other factors, DEP's ability to conduct dedicated waste ban inspections was greatly reduced. However, DEP continued to conduct waste ban inspections as part of other facility inspections, conducting over 100 such inspections.

- **Waste Ban Focus Group** - DEP held a Focus Group in September 2003 with facility operators to review waste ban data provided through annual solid waste facility reports and discuss apparent trends in reported data, including overall failed loads and failed loads by material. The forum also included discussions on how to improve the waste ban reporting form and how to make waste ban inspections function more effectively.

- **Waste Ban Guidance Revisions** – As part of the development of the C&D waste ban, DEP drafted revisions to the Waste Ban Guidance Document, which was made available for public comment along with the proposed revisions to 310 CMR 19.000.

- **Landfill Gas Oversight** – DEP spent considerable time examining landfill gas (LFG) issues. In 2003 the two primary areas of focus were 1) establishing appropriate management practices to protect public health and safety from the potential adverse effects of Hydrogen Sulfide emissions (reported elsewhere in this report) and 2) the public safety issues related to the explosion potential of LFG, primarily methane. DEP is developing and implementing steps to ensure that landfills, both active and inactive, are performing the necessary LFG monitoring and taking appropriate remediation actions. These measures include timely review of LFG monitoring reports and developing a data system to facilitate the tracking of LFG monitoring results.

- **Comprehensive Facility Inspections** – Conducted almost 500 inspections or site visits to solid waste facilities (landfills, transfer stations, combustion facilities, etc.) or solid waste regulated activities such as recycling or beneficial reuse, including over 100 waste ban inspections directed at waste ban compliance issues (also referenced above.)

- **Enforcement and Penalties** – Conducted over 85 enforcement actions were taken against solid waste facilities for failure to fully comply with DEP's regulations. These violations ranged from relatively minor issues, such as litter, to major infractions, such as operating a facility without the required permits. As a result of these enforcement activities, over $300,000 in penalties were issued.

Waste Planning Projects

- **Master Plan Review** – Began a review of Master Plan policies, goals, and strategies. After initial development, DEP decided to continue this review in Fall 2004 when additional information is available to inform discussions.

- **Integrating Solid Waste Program Activities into Broader Priority Setting** – Analyzed solid waste program priorities and targets as part of a broader planning effort for DEP's Bureau of Waste Prevention. This includes both highlighting sectors of the wastestream to target for greatest waste reduction potential and targeting compliance, enforcement, and inspection efforts on the facilities and activities that pose the greatest compliance risks and environmental and human health risks due to lack of compliance.

- **Solid Waste Progress Report and Data Gathering** – Continued core data surveys (including the municipal recycling data sheets, the compost site report, recycling and C&D processors surveys), calculation of annual waste reduction rates, preparation of disposal capacity projections, and issuance of annual solid waste progress reports. DEP also continued the review of annual facility reporting for other solid waste facilities.
    - The release of the 2001 Solid Waste Progress Report was delayed until late 2003, so that DEP could have up-to-date economic data on which to base waste reduction rates for 2001. In the future the progress report will continue to be released on this same schedule, approximately 18 months after the end of each year.

- **Developing Electronic Reporting Capabilities** – As part of DEP's broader EGov initiative, worked on enabling electronic submittals of annual solid waste facility reports, compost reports, and recycling processor surveys for the calendar year 2004 reporting year. Electronic reporting will streamline data QA/QC by ensuring that data are reported correctly and completely, thereby reducing DEP and facility staff time spent on checking and correcting reported data.

- **Solid Waste Advisory Committee:** Continued to coordinate the Solid Waste Advisory Committee (SWAC) and subcommittee meetings in FY04. The following subcommittees were active in FY04:
    - **C&D Subcommittee:** The C&D subcommittee consists of a diverse group of more than 120 stakeholders representing all groups interested in C&D management. Meetings are held every two months and guest speakers are invited to discuss C&D diversion opportunities. Workgroup meetings are held in between full subcommittee meetings.
    - **Organics Subcommittee:** The Organics subcommittee met quarterly during 2003 and 2004 to provide input to DEP on how to increase composting in Massachusetts. In

particular, the subcommittee's discussions focused on increasing diversion of commercial and institutional food waste. The Subcommittee helped to plan the 2004 Organics Summit.

- **Data Subcommittee:** The Data Subcommittee provides input to DEP on the state's solid waste, recycling, and waste reduction data. The Data Subcommittee met twice to review the draft data and data methodology issues in this report.

APPENDIX A
Data Collection and Analysis

This Appendix describes how DEP collects and analyzes solid waste data.

Data Collection

Table A-1 shows the sources DEP relies on to track solid waste data. Each of the data sources is described below.

Table A-1: Major Solid Waste Data Sources

Data Type	Data Source
Disposal	• Annual Facility Reports
Imports / Exports	• Annual Facility Reports • Survey of Other States Data
MSW Recycling	• Survey of Recycling Processors • Survey of Municipalities • Bottle Bill Tonnage
Composting	• Composting Facility Reports • Survey of Municipalities • Residential Organic Waste Management Study
C&D Recycling	• Survey of C&D Processors
Other C&D Diversion	• Annual Facility Reports • Survey of C&D Processors

Annual Facility Reports

In Massachusetts, all landfills, combustion facilities, transfer stations and handling facilities must submit annual reports to DEP summarizing the type and quantity of waste managed. Data from the landfill and combustion facility reports provide information regarding total tonnage of waste disposed in Massachusetts. The reports also contain information on the import and export of waste.

Survey of Other States Data

In addition to using Annual Facility Reports, DEP gathers information on the import and export of solid waste across state lines by contacting neighboring state solid waste management agencies and significant out-of-state facilities. DEP compares amounts from each of these sources to Massachusetts' data and the largest import/export amount is used.

Municipal Recycling Survey

Each year, DEP surveys all 351 cities and towns in the Commonwealth to determine the quantity of waste recycled through municipal recycling programs. Recyclables counted are generated by single-family homes and some multi-family residences. The survey also collects data on centralized (off-site)

composting of leaf and yard waste that is used to determine the amount of residential composting[17] taking place at municipal and commercial composting facilities. DEP adjusts centralized composting of leaf and yard waste to account for non-reporting towns that operate leaf and yard waste collection programs. DEP does not adjust reported recycling tonnages to account for municipalities who did not report or whose data is incomplete. However, DEP does estimate waste generation for these municipalities. DEP uses a regression analysis based on the towns that do report and multiplies the resulting index of the amount of per capita waste generated (.38 tons per year) by the population of each town lacking generation data.

Composting Facility Reports

Each year, DEP sends a composting survey to all municipal and commercial composting sites. This survey provides the total centralized composting tonnage. To derive a base commercial composting[18] amount, the total amount of residential composting from the municipal recycling survey is subtracted from the total amount reported on the composting facility reports. 100,000 tons is added to the base commercial composting amount to account for farm composting which is not reported to DEP. This figure is an estimate from the Massachusetts Department of Agricultural Resources (DAR).

Survey of MSW Recycling Processors

Each year, DEP surveys all known recycling processors in the state. For known processors that do not respond, their reported tonnages from the previous years are adjusted for average increases or decreases in recycling and carried over. These survey results provide the total statewide MSW recycling tonnage. See below for an explanation of how residential and commercial recycling figures are calculated from this figure.

Survey of C&D Processors Survey

Each year, DEP surveys all known companies that process construction and demolition (C&D) debris for reuse. The companies are surveyed for information on the type and amount of material processed, and the results are used to estimate the C&D recycling rate. DEP attempts to contact all the processors that handle C&D waste. For quantities handled by known processors that do not respond, numbers from the last survey performed are adjusted for increases or decreases in recycling and carried forward.

Bottle Bill Tonnage

Bottle bill recycling results are credited toward the residential recycling rate. Container recovery (i.e., deposit redemption) rates are obtained from the Massachusetts Department of Revenue. DEP estimates the recycled tonnage using trade association data on both material composition (glass, aluminum, plastic, etc) of the beverage containers recovered and average unit weights for different container types. Composition percentages are adjusted based on information provided by deposit container collection companies to reflect the specific conditions in Massachusetts.

[17] Composting tonnage is considered residential if it originates from a residential source, regardless of where it is composted.

[18] Composting tonnage is considered commercial if it originates from a commercial source, regardless of where it is composted.

Data Calculations

The following formulas and definitions are used to estimate quantities in Table 3, Solid Waste Generation and Management, 1997 – 2002. The terms, emphasized in bold type, are presented in the same order in which they appear in the table. Also, completely lower case terms are not included in the table but are calculated in the data analyzed.

Potential Generation = Estimated Generation for 2002 based on multiplying 1990 generation by change in Gross State Product from 1990 to 2002. For 2002, Gross State Product figures were not readily available, so DEP used the Leading Economic Indicators Index as a surrogate for Gross State Product. (See below section on 2002 Methodology Changes for more detail on this issue.)

Source Reduction = Potential Generation – Actual Generation (listed separately for MSW and non-MSW)

Total Generation = In-State Disposal + Diversion + Disposal Exports – Disposal Imports

MSW Generation = MSW Disposed + MSW Diverted + MSW Exported - MSW Imported
- **Residential Generation** = Residential Recycling + Residential Composting + Residential On-site Composting + Bottle Bill + MSW Disposed.
- **Commercial Generation** = MSW Generation - Residential Generation

Non-MSW Generation = C&D + Other Non-MSW Generation
- **C&D Generation** = C&D Disposed + C&D Recycled + C&D Other Diversion + C&D exported – C&D imported
- **Other (non-MSW) Generation** = Other Disposed + Other diverted + Other exported – Other imported

Diversion = MSW Diversion + Non-MSW Diversion

- **MSW Diversion** = Residential Recycling + Commercial Recycling + Residential Off-site Composting + Commercial Composting[19]
  - **Residential Recycling** is estimated using municipal recycling survey data plus bottle bill data.
  - **Commercial Recycling** = MSW Recycling (estimated using commercial processors survey and bottle bill data) - Residential Recycling
  - **Residential Off-site Composting** is estimated using the municipal recycling survey data.
  - **Commercial Composting** is estimated using composting facility report data – Residential Composting + DAR estimates for farm composting.

- **Non-MSW Diversion** = C&D Recycling + C&D Other Diversion
  - **C&D Recycling** is estimated using data from the C&D processors survey.
  - **C&D Other Diversion** includes C&D fines used for landfill cover, wood burned as fuel, and C&D residuals used for inactive landfill closures.

Disposal = Landfill Disposal + Combustion Disposal + Disposal Exports – Disposal Imports

[19] Residential on-site composting, or home composting, is not counted as part of MSW Diversion, but instead as source reduction.

Disposal Exports and **Imports** are estimated using data from Annual Facility Reports and a survey of other states.

Landfill Disposal = MSW Disposal + C&D Disposal + Other Disposal

MSW Disposal is estimated using data from Annual Facility Reports

C&D Disposal is estimated using data from Annual Facility Reports

Other Disposal is estimated using data from Annual Facility Reports, and represents all non-MSW disposal other than C&D (e.g., contaminated media, recycling residues, industrial waste, street sweepings, etc.)

Combustion = MSW Combustion + non-MSW Combustion

MSW Combustion is estimated using data from Annual Facility Reports

Non- MSW Combustion is estimated using data from Annual Facility Reports

Methodology Changes for 2002

- **Counting C&D Residuals**
  In order to better account for materials generated in Massachusetts, DEP added an additional diversion category in 2001 titled "C&D Other Diversion" and consisted of C&D Fines and Wood for Fuel. In 2002, there also were C&D Residuals used for grading and shaping in landfill closures, which also were counted in this category. These materials are considered to be beneficially used, as opposed to recycled or disposed and therefore are counted in generation and diversion rates (but not in recycling rates or disposal tonnage).

- **Gross State Product for Calculating Potential Generation and Source Reduction**
  DEP uses an economic driver to calculate potential generation and source reduction. In this methodology, DEP estimates what generation would have been in the current year if generation had increased in line with the Gross State Product figure. The difference between this potential generation and actual generation is attributed to source reduction.

  For 2001, DEP used an estimated Gross State Product (GSP) figure that was later revised, resulting in the initially reported 2001 waste reduction of 54 % changing to 57 %. In order to avoid this type of change in the future, DEP had anticipated waiting for final 2002 GSP figures before calculating the 2002 source reduction tonnage and waste reduction rate. These figures are typically available 18 months after the end of the given calendar year. However, the GSP figure for 2002 is not scheduled for release until December 2004. In order to release source reduction and waste reduction figures with this Progress Report, DEP estimated GSP based on the current economic index for Massachusetts, which is calculated by "*Mass Benchmarks"*, a project sponsored through the UMASS Donahue Institute. DEP expects to resume use of GSP for 2003 data in the next progress report.

- **Estimation Of Growth Rates For MSW Generation, Recycling And C&D Diversion Rate**
  The Beyond 2000 Solid Waste Master Plan projected that MSW Generation would increase 1.5% per year until 2006, and then level off, MSW Recycling would increase 1.4% per year, and the Non-MSW Recycling rate would reach a rate of 85% by 2006 and level off.

  In 2002, these assumptions were changed to better reflect what has happened historically since DEP began collecting data in 1994. A historical average for MSW generation results in an increase of 2.0% per year and a MSW recycling increase of 0.45% a year. The Non-MSW Recycling Rate was changed to the C&D Diversion Rate (to better account for all materials being generated, recycled and otherwise diverted from disposal) and is projected to increase 0.55% per year.

- **Carry Over Of Survey Tonnage**
  Each year, DEP surveys recycling processors. In the past, if a facility did not respond to the survey, DEP carried forward the facility's tonnage reported for the previous or most recent year.

  In order to get a better estimate of the recycling and composting tonnage for those facilities surveyed that did not respond to the 2002 survey but did respond to the 2001 survey, DEP applied a % change, reflecting the average change in tonnage reported by all processors.

  Recycling processors that reported both in 2001 and 2002 showed on average a decrease of 15% in recycled tonnage, C&D processors that reported both in 2001 and 2002 showed on average a decrease of 5% in recycling tonnage, and compost facilities reported an increase of 12%, compared to companies that reported in 2001. DEP applied these averages to companies that reported in 2001 but not in 2002 to generate a more conservative estimate of their 2002 tonnage.